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(54) **SASH WINDOW**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,896,589 A * 7/1975 Mitchell E06B 1/34 49/425
4,624,073 A * 11/1986 Randall E05D 15/22 292/164

(Continued)

FOREIGN PATENT DOCUMENTS

DE 19 36 132 A1 1/1971
EP 1 443 171 A1 8/2004

(Continued)

OTHER PUBLICATIONS

May 22, 2013 Search Report issued in International Application No. PCT/FR2012/052096.

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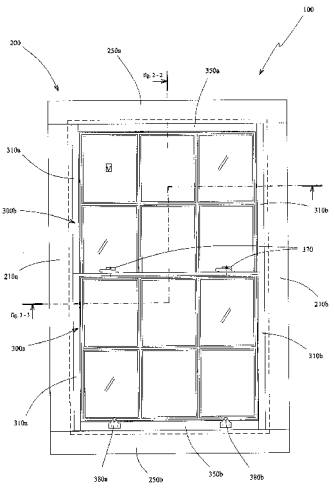
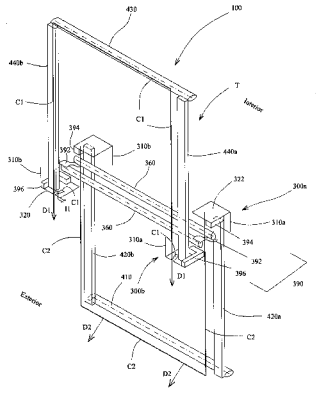
(57) **ABSTRACT**

A sash window includes a fixed frame in which at least one inner sliding frame can slide between an open position and a closed position of the window, and at least one sliding or fixed outer frame, seals being interposed between the fixed frame and the inner sliding frame, a sealing system including, for the inner sliding frame, two lateral seals, a top cross-member seal, for the outer frame, and a bottom cross-member seal. Additionally, the invention the sealing system includes intermediate seals that join on each side of the sliding frame the cross-member seals and the lateral seals, so as to form a continuity of sealing between these seals in the closed position of said inner sliding frame. The lateral junction region between the inner sliding frame and the outer frame is thus connected by a sealing system that makes them sealed vis-à-vis each other.

10 Claims, 6 Drawing Sheets





(51) **Int. Cl.**
E06B 7/23 (2006.01)
E06B 7/14 (2006.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

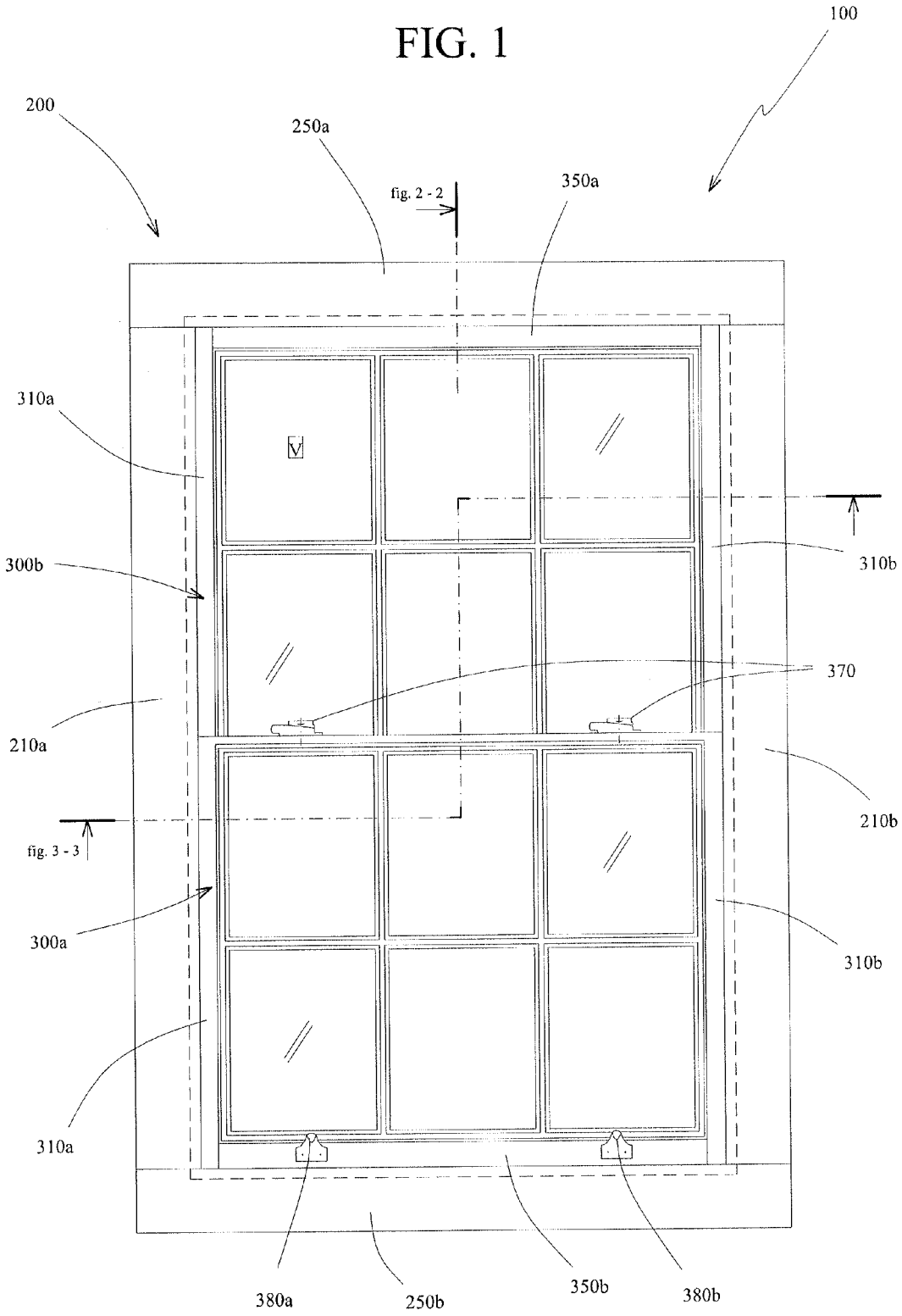
4,656,783	A *	4/1987	Ahonen	E06B 3/44 49/404
4,941,288	A *	7/1990	Morton	E06B 3/44 49/408
4,958,468	A *	9/1990	Nolan	E06B 3/222 49/DIG. 2
5,042,199	A *	8/1991	Schneider	E06B 3/44 49/446
5,274,955	A *	1/1994	Dallaire	E06B 3/44 49/406
5,414,962	A *	5/1995	Forbis	B29C 66/1142 49/414
5,649,389	A *	7/1997	Coddens	E05D 15/22 49/176
6,067,754	A *	5/2000	Bellart	E05D 15/0686 49/453
6,293,049	B1 *	9/2001	Shaw	E06B 1/366 49/183
7,065,929	B2 *	6/2006	Manzella	E06B 3/26347 52/204.1
7,174,939	B1 *	2/2007	Spencer	E06B 3/44 160/90
7,246,466	B2 *	7/2007	Turner	E06B 3/44 49/408
7,296,381	B1 *	11/2007	McCabe	E06B 3/44 49/176
7,882,657	B2 *	2/2011	Duncan	E05C 1/10 49/183
8,869,453	B1 *	10/2014	Jordan	E06B 3/4407 49/404
2006/0150561	A1 *	7/2006	Van Klompenburg	E05C 17/24 52/633
2007/0157520	A1 *	7/2007	Daniels	E06B 3/44 49/163
2007/0157521	A1 *	7/2007	Ito	E06B 3/5063 49/185
2007/0290456	A1 *	12/2007	Speyer	E05C 19/002 277/628
2008/0060276	A1 *	3/2008	Speyer	E06B 7/16 49/495.1
2008/0104892	A1 *	5/2008	Cox	E06B 5/12 49/504
2008/0202033	A1 *	8/2008	Hancock	E06B 3/303 49/472
2009/0031635	A1 *	2/2009	Davis	E06B 7/16 49/478.1
2009/0199495	A1 *	8/2009	Garries	E06B 3/44 52/204.1
2009/0199496	A1 *	8/2009	Garries	E06B 1/702 52/213
2010/0205866	A1 *	8/2010	Reithmeyer	E06B 7/14 49/408

FOREIGN PATENT DOCUMENTS

EP	1 965 012 A1	9/2008
EP	2 088 275 A2	8/2009
FR	2 209 884 A1	7/1974
WO	2012/093382 A1	7/2012

* cited by examiner

FIG. 1


100
200
250a
fig. 2 - 2
350a
310a
300b
310b
370
210a
210b
fig. 3 - 3
300a
310b
310a
380a
250b
350b
380b

PL. 2/6

FIG. 2

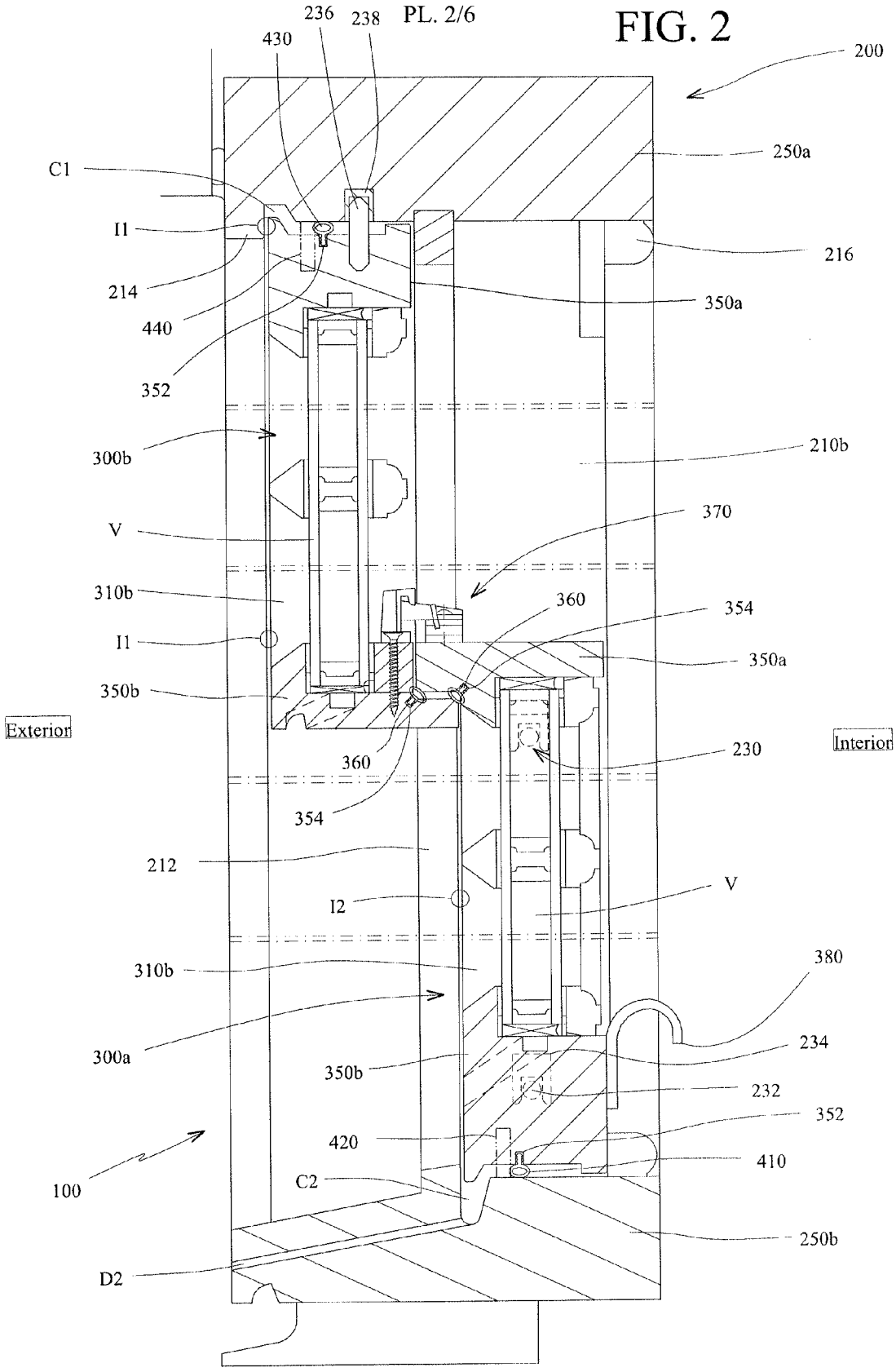

236
238
430
200
250a
C1
I1
216
214
350a
440
352
300b
210b
370
V
310b
360
354
I1
350a
350b
Exterior
Interior
360
230
354
212
V
I2
380
310b
234
300a
350b
232
352
420
410
100
C2
250b
D2

FIG. 3

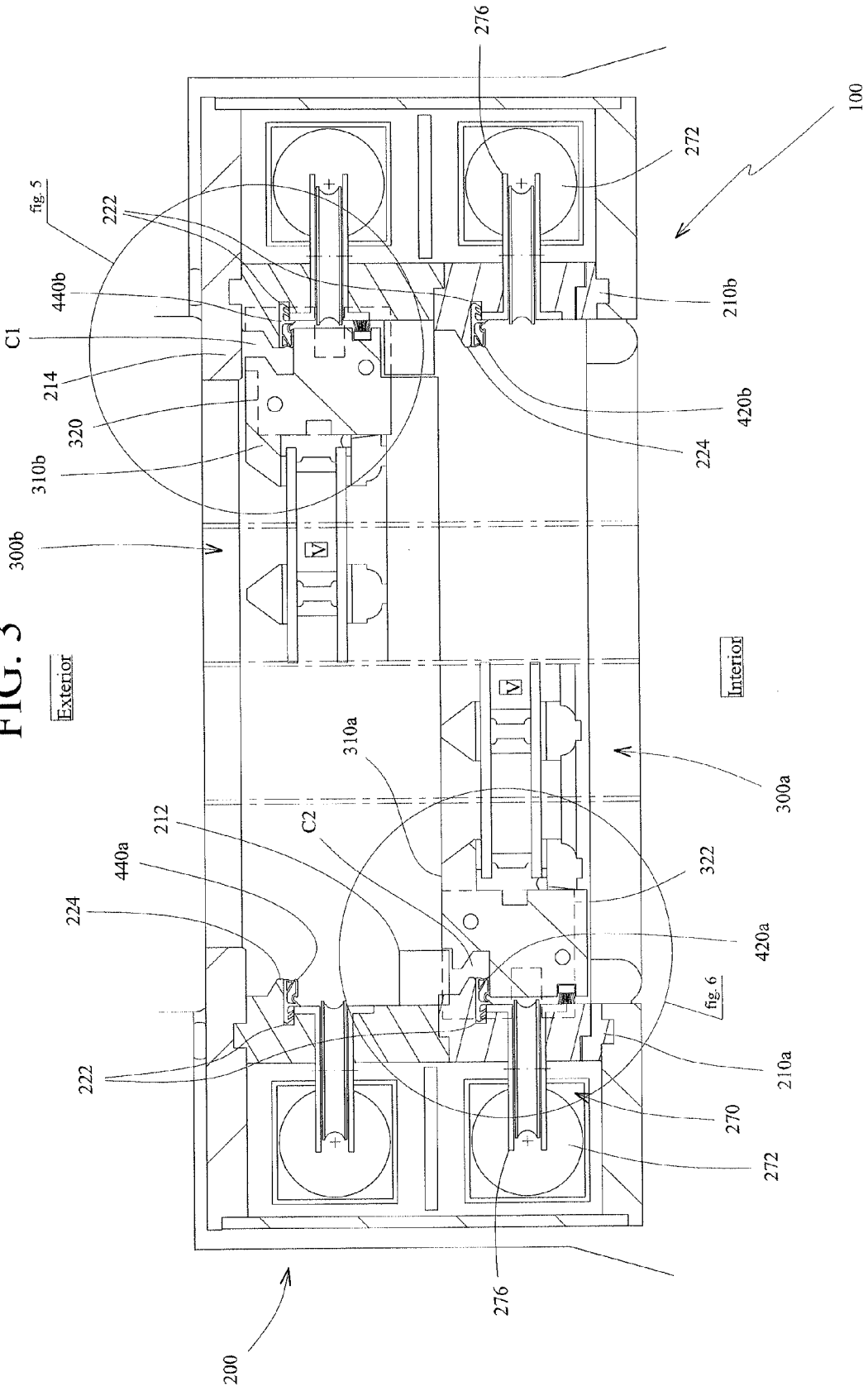

276
100
272
fig. 5
222
440b
210b
C1
214
320
420b
224
310b
300b
Exterior
Interior
310a
300a
212
C2
322
440a
224
420a
fig. 6
222
210a
270
272
276
200

FIG. 4

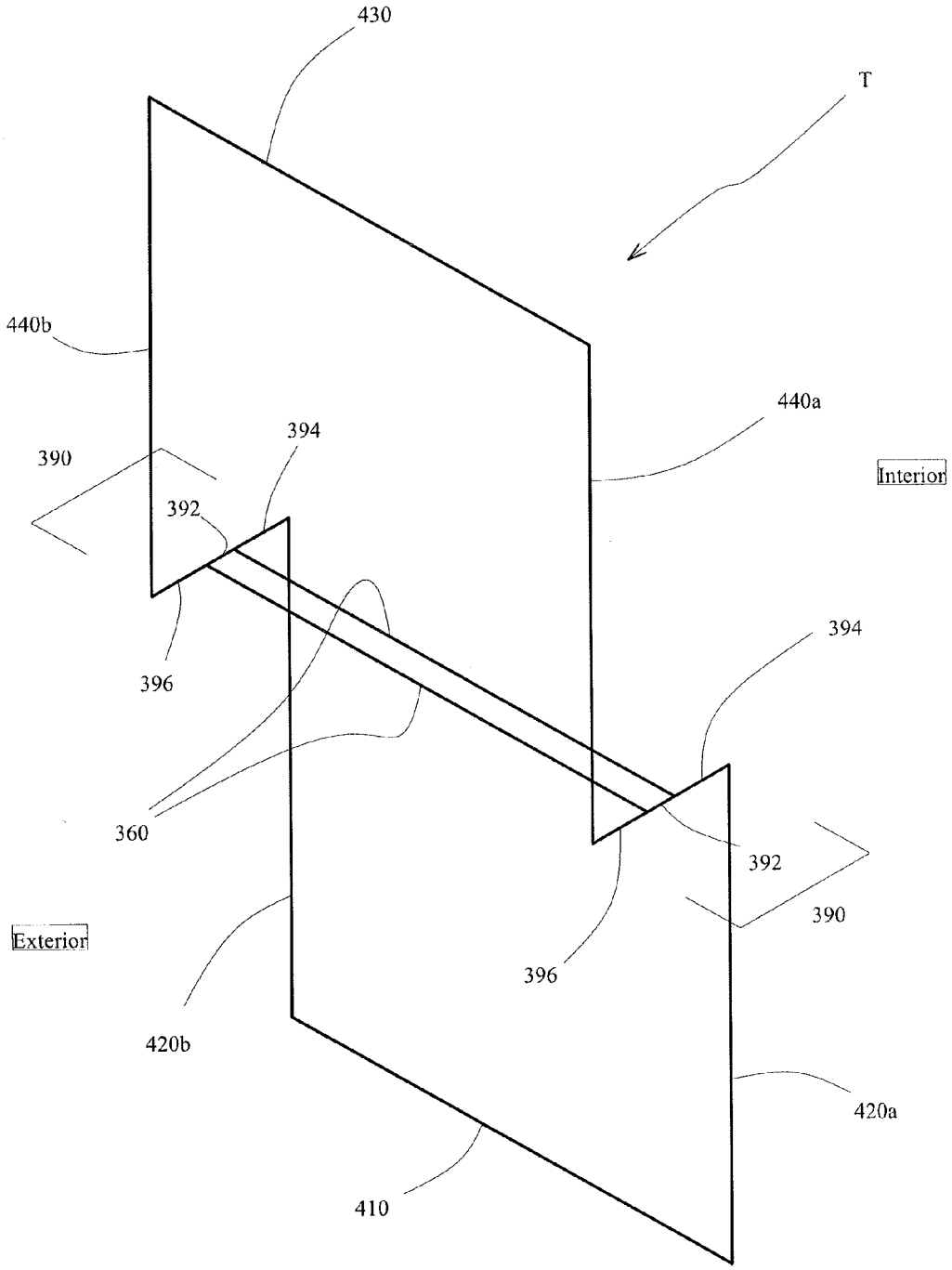

430
T
440b
440a
394
390
Interior
392
396
394
360
392
390
Exterior
396
420b
420a
410

FIG. 5

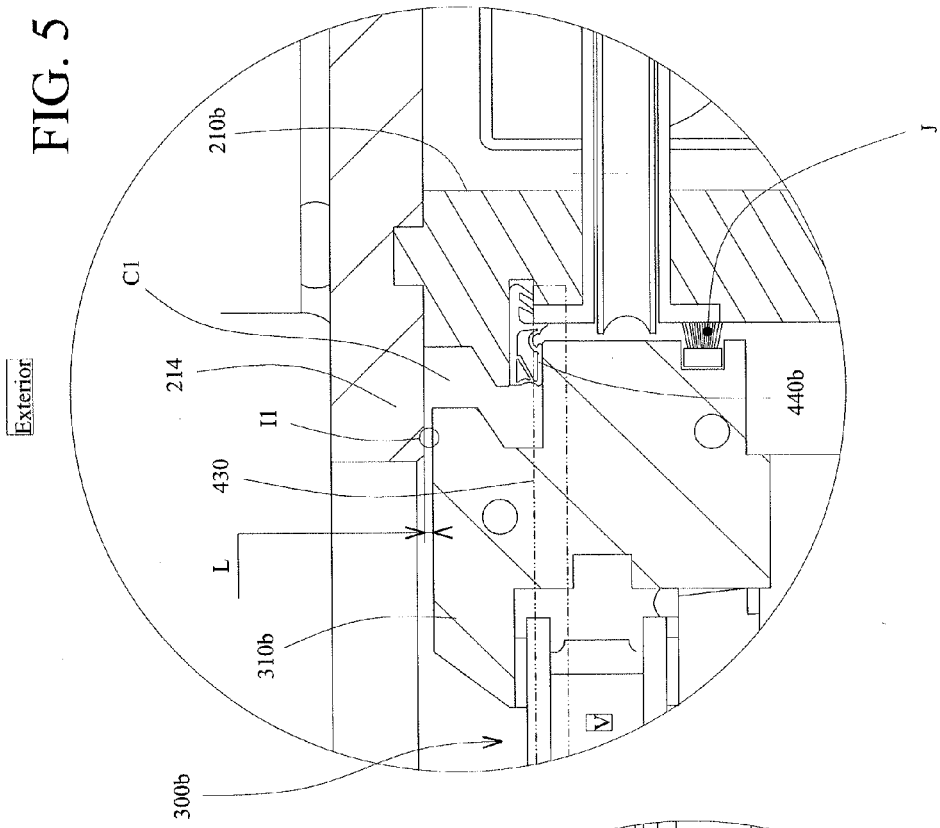

Exterior
210b
C1
214
I1
430
L
310b
300b
V
440b
J

FIG. 6

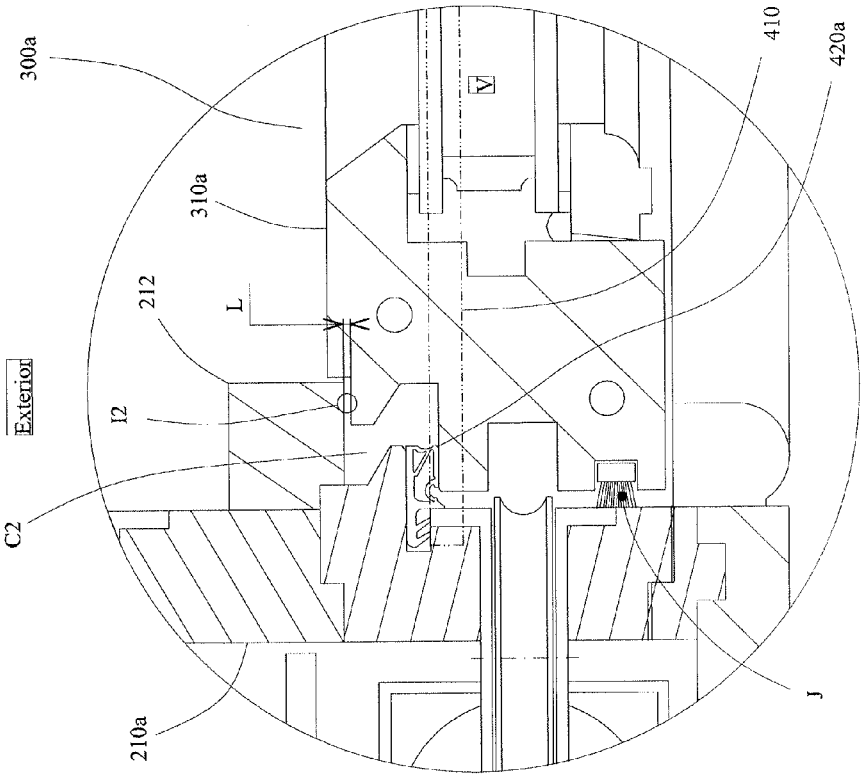
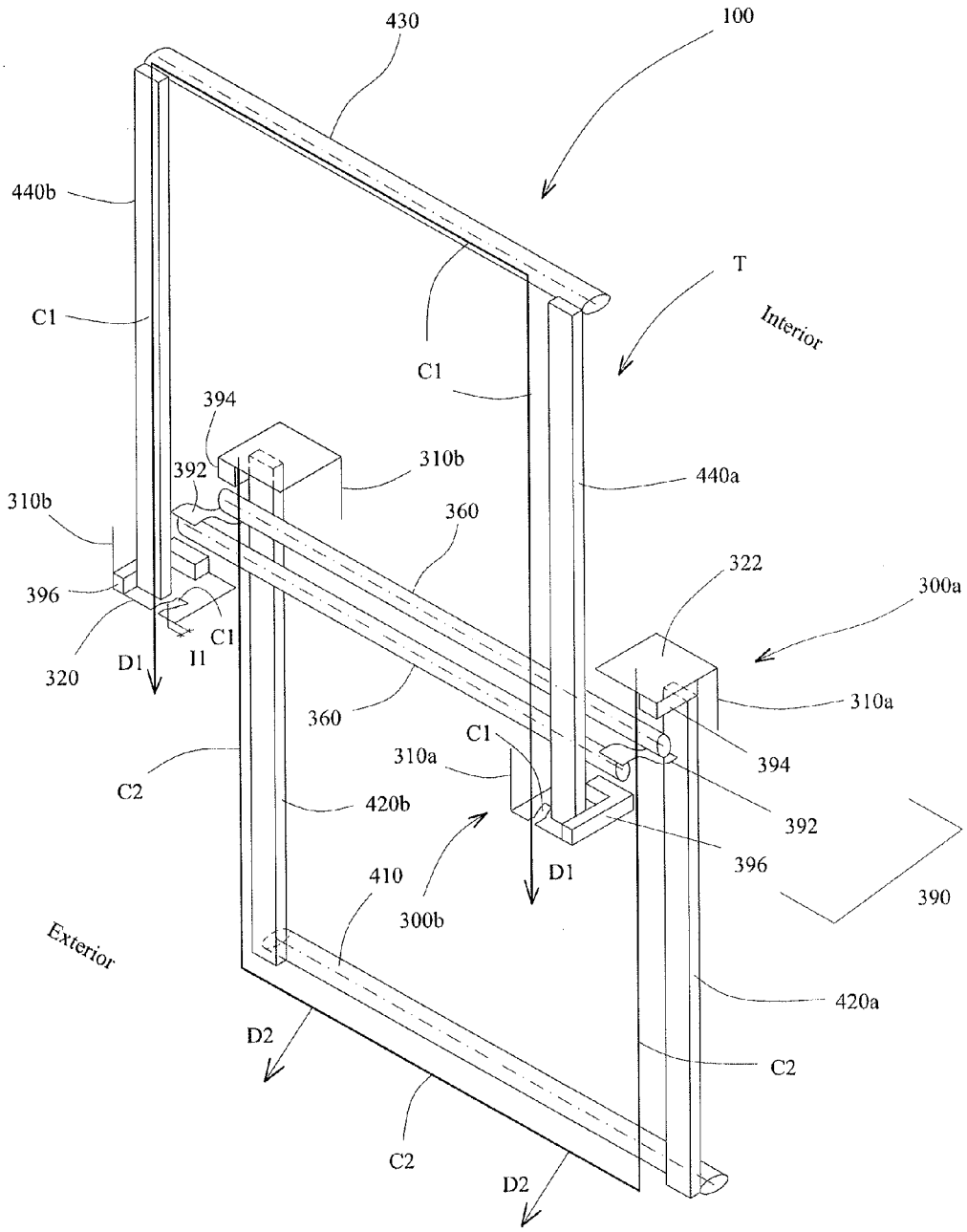

300a
310a
212
L
Exterior
I2
C2
210a
V
410
420a
J

FIG. 7


430
100
440b
T
C1
Interior
C1
394
392
310b
440a
310b
360
322
300a
396
C1
320
D1
I1
360
310a
C1
310a
394
C2
420b
392
396
410
D1
300b
390
Exterior
420a
D2
C2
C2
D2

SASH WINDOW

The present invention relates to a sash window, that is to say a window comprising a fixed frame provided with at least one sliding frame, the fixed frame being intended to be disposed in a vertical or almost vertical plane and the sliding frame being able to slide from bottom to top and vice versa between an open position and a closed position of the window. This type of sash window is frequently used in countries that belonged to the British Empire and in northern Europe.

The fixed frame generally consists of profiles assembled in a framework, comprising two uprights in which one or more runners are provided for the sliding frame or frames to slide and two top and bottom cross members forming a stop for the sliding of said sliding frames. A compensation mechanism, using for example counterweights or springs, can be used so that the person manoeuvring a sliding frame does not have to support all its weight. A lock makes it possible to lock the sliding frame or frames in their closed position of the window.

The sealing of the sliding frames in their closed position is generally obtained by lateral seals held in the runners that act by natural compression on bearing surfaces, at the end of the installation of the window, whereas the horizontal sealing, that is to say top sealing on the top cross member, bottom on the bottom cross member, and between the sliding frames, in an overlap area, requires seals that are compressed only in the closed position of said sliding frames.

Unlike a casement window where the casements greatly compress the seals when they are closed, there remains a difficulty in sealing two regions situated laterally between two adjacent frames of a sash window.

Thus the applicant has sought a solution for increasing the level of sealing of a sash window, in particular to meet the requirements of certain standards.

SUMMARY

To this end a sash window is proposed comprising a fixed frame in which at least one inner sliding frame can slide, able to move between an open position and a closed position of the window, at least one sliding or fixed outer frame, seals being interposed between the fixed frame and said inner sliding frame, a sealing system comprising, for said inner sliding frame, two lateral seals, a top cross-member seal, for the outer frame, and a bottom cross-member seal; according to the invention, the sealing system comprises intermediate seals that join each side of the sliding frame, the cross-member seals and the lateral seals, so as to form a continuity of sealing between these seals in the closed position of said inner sliding frame.

The lateral junction region between the inner sliding frame and the outer frame is thus connected by a sealing system that makes them sealed relative to each other.

According to an additional feature of the invention, the intermediate seals comprise two connecting seals held in contact respectively with the two lateral seals and which bear on the two ends of the top cross-member seal of said inner sliding frame in its closed position.

These intermediate seals work between the lateral seals and the cross-member seals of the inner sliding frame in order to effect a sealed connection between them.

According to an additional feature of the invention, the intermediate seals comprise two end seals respectively sandwiched between the two ends of the cross-member seals in the closed position of the inner sliding frame.

These end seals procure continuity of perimeter sealing between the two cross-member seals, in this way closing off two lateral passages between the inner sliding frame and the outer frame.

According to an additional feature of the invention, the lateral seals are held in two uprights forming the fixed frame, being applied against the front face of two corresponding uprights constituting the inner sliding frame, and the window comprises a bottom seal held in the bottom cross member of said inner sliding frame, the bottom seal being put in contact by broadening against ends of the lateral seals, bearing on the bottom cross member of the fixed frame.

In this way continuity of sealing in a U shape between the ends of the bottom seal and the lateral seals of the inner sliding frame is obtained.

According to an additional feature of the invention, the outer frame is of the sliding type, the intermediate seals comprise two other connecting seals held in contact respectively with two other lateral seals retained in the two uprights of the fixed frame while being applied against the front face of two corresponding uprights constituting the outer sliding frame, said first other connecting seals bearing on the two ends of the bottom cross-member seal of said outer sliding frame in its closed position, a top seal being held in the top cross member of said outer sliding frame, the top seal being put in contact by broadening against the ends of said second other lateral seals while bearing on the top cross member of the fixed frame.

Perimeter sealing of the outer sliding frame is achieved by this arrangement of seals.

According to an additional feature of the invention, a first gap is provided between the framework of the fixed frame and the front face of the top cross member as well as the front face of the two uprights of the outer sliding frame, and the width of which is sufficiently small to prevent drops of water passing.

The presence of this gap prevents water, coming for example from driving rain, entering as far as the seals of the outer sliding frame.

According to an additional feature of the invention, the first gap emerges in a first pressure-balancing chamber that communicates with the two lateral seals of the outer sliding frame as well as with the top seal, said chamber having an inverted U shape, the bottom ends of its two vertical branches being emergent.

These seals are thus subjected, on their exposed parts on the outside of the window, to the outside barometric pressure. The absence of any overpressure assists the sealing work of the seals. The chamber being emergent at the bottom part, the water liable to enter therein is discharged therefrom, keeping the seals dry in order to guarantee their effectiveness.

According to an additional feature of the invention, the fixed frame comprises two vertical separation strips and a second gap is provided between the two vertical strips and the front face of the two uprights of the inner sliding frame, and the width of which is sufficiently small to prevent drops of water passing.

The presence of this gap prevents water, coming for example from driving rain, entering as far as the seals of the inner sliding frame.

According to an additional feature of the invention, the second gap emerges in a second pressure balancing chamber that communicates with the two lateral seals of the inner sliding frame, said chamber having a U shape, the bottom horizontal arm of which is connected to at least one drain.

These seals are thus subjected, on their exposed parts on the outside of the window, to the external barometric pressure. The absence of overpressure assists the sealing work of the seals. Since the chamber emerges at the bottom part through the drain, any water liable to enter therein is discharged therefrom, keeping the seals dry in order to guarantee their effectiveness.

According to an additional feature of the invention, the free ends of the two vertical branches of the two chambers are closed off by inserts that hold the connecting seals respectively in place, the inserts closing the bottom ends of the two vertical branches of the first chamber being perforated to enable any water droplets to be discharged.

These inserts have several functions; they serve as a support for the fixing of the connecting seals, they serve as drains at the bottom part of the vertical branches of the first chamber, and they close off the top outlets of the vertical branches of the second chamber.

According to an additional feature of the invention, the window is provided with means for positioning at least one sliding frame, active in its closed position, and which are designed to prestress respectively the lateral seals of said or each sliding frame against the front faces of the uprights of said sliding frame.

The seals, being pressed on their bearing faces, function well and are more effective.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention mentioned above, as well as others, will emerge more clearly from a reading of the following description of an example embodiment, said description being given in relation to the accompanying drawings, among which:

FIG. **1** depicts a front view of a sash window seen from its inside according to the invention,

FIG. **2** depicts a view in longitudinal section of a sash window according to the invention,

FIG. **3** depicts a view in transverse section of a sash window according to the invention,

FIG. **4** depicts a schematic view in perspective of a sealing system for a sash window according to the invention,

FIG. **5** depicts a first detail of a view in transverse section of a sash window, showing a gap connected to a pressure-balancing chamber according to the invention,

FIG. **6** depicts a second detail of a view in transverse section of a sash window, showing another gap connected to another pressure-balancing chamber according to the invention, and

FIG. **7** depicts a view in perspective of a sealing system and two pressure-balancing chambers in a sash window according to the invention.

DETAILED DESCRIPTION

The sash window **100** presented in FIG. **1** is intended to be installed vertically or almost vertically in a wall opening of a dwelling or building.

It consists of a fixed frame **200** and two sliding frames **300***a*, **300***b*, able to move between an open position allowing air to enter through said window and a closed position of the window. The movement of each sliding frame is ascending or descending in the position in which the window is installed. The inner sliding frame **300***a*, that is to say the one that is recessed, is disposed at the bottom whereas the outer sliding frame **300***b* is disposed at the top. It should be noted however that the outer sliding frame **300***b* may be replaced, in a variant embodiment of the window that is not shown, by a fixed outer frame, so that window is opened by opening only the inner sliding frame **300***a*. The window may also incorporate, in another variant embodiment that is not shown, an intermediate sliding frame disposed between the two frames **300***a* and **300***b*.

The fixed frame **200** consists of a framework formed by two uprights **210** joined at their two ends respectively by two cross members **250**, a top cross member **250***a* and a bottom cross member **250***b*. The fixed frame is advantageously constructed from wood firstly for its relatively good thermal insulation coefficient and secondly for the distinction of this material and the quality appearance that it procures for the window.

In FIG. **2**, a separation strip **212** is fixed in a longitudinal groove in each upright **210** in order to separate the two sliding frames. Each upright **210** is bordered on its face intended to be turned towards the outside with an extension in a return **214** forming, with the strip **212**, a vertical guidance roller for the outer sliding frame **300***b*. The extension in a return **214** issues from the top cross member **250***a* and the two uprights **210**.

Attached elements **216** are fixed at the emergence of the framework through its inner frame forming, with the strip **212**, a vertical guide runner for the inner sliding frame **300***a*.

In FIGS. **1** and **2**, each sliding frame **300** consists also of a framework formed by two uprights **310** joined at their two ends respectively by two cross members, a so-called top cross member **350***a* and a so-called bottom cross member **350***b*. A glass pane V is kept trapped in the framework of each sliding frame.

At least one latch **370** is fixed to the cross members turned facing the two sliding frames **300***a* and **300***b* in their closed position in order to be able to lock them mutually in this position. Two latches **370** are visible in FIG. **1**.

At least one manoeuvring means **380**, such as a gripping handle, is fixed to the bottom cross member **350***b* of the inner sliding frame **300***a*.

So that the user does not have to lift the whole weight of the sliding frame when it is opened, each sliding frame **300** is assisted, in FIG. **3**, by a means **270** for compensating for its weight, so that manoeuvring it is easier. This compensation means comprises, in this FIG. **3**, two counterweights **272** mounted for sliding in the uprights **210** of the fixed frame and which are attached to a sliding frame by means of links (not shown) passing round two pulleys **276** anchored at the top part of the fixed frame. The compensation means may also comprise springs.

In order to obtain a relatively high level of airtightness and watertightness between the sliding frames and the fixed frame, a sealing system has been developed and, for at least one sliding frame, a drainage system and a pressure-balancing chamber downstream of the sealing system, that is to say on its side turned towards the outside.

In FIG. **4**, the sealing system T comprises, for the inner sliding frame, a bottom seal **410** and two lateral seals **420***a* and **420***b*, intended to be interposed between said inner sliding frame and the fixed frame. It also comprises, for the outer sliding frame, a top seal **430** and two lateral seals **440***a* and **440***b*, intended to be interposed between said outer sliding frame and the fixed frame.

In FIG. **2**, the bottom seal **410** is composed of a flexible profile comprising an anchoring nose housed in a groove **352** produced longitudinally in the width of the bottom cross member **350***b* of the inner sliding frame **300***a*, the anchoring nose being connected to a sealing weatherstrip, advantageously with a circular cross section. In the closed position

of the inner sliding frame **300***a*, visible in this FIG. **2**, the bottom seal **410** is put in contact, while broadening, on the inner face of the bottom cross member **350***b*. The anchoring nose is bordered by fir-tooth shaped fins for increasing retention thereof in said groove.

It will be noted, in this FIG. **2**, that the circular cross section of the bottom seal **410** becomes elliptical and therefore broadened in the closed position of the inner sliding frame **300***a* so that it comes into contact with a flat sealing part of the lateral seal **420**, represented by a dot-and-dash line in this FIG. **2**, procuring continuity of sealing between the bottom seal and the two lateral seals **420**.

In FIG. **3**, each lateral seal **420***a* and **420***b* has roughly a rectangular cross section comprising, on one edge, an anchoring part housed in a groove **222** produced longitudinally over at least part of the height of the corresponding upright **210** and more precisely a little more than the height of the inner sliding frame **300***a*, when it is disposed in its closed position, and, from its other edge, said flat sealing part intended to come into contact with the front face of a corresponding upright **310** of the inner sliding frame **300***a*. Each lateral seal **420***a* and **420***b* has up against it a wall opposite to the flat sealing part and which extends the anchoring part, on a rim **224** that projects perpendicularly on the inner face of each upright **210**, in line with a side of said groove. The rim **224** is disposed so that the flat sealing part is turned inwards.

This rim extends over the entire useful length of the seal, that is to say over at least part of the height of the corresponding upright **210** and more precisely a little more than the height of the inner sliding frame **300***a*, when it is disposed in its closed position.

In FIG. **4**, this continuity of sealing between these three seals **420***a*, **410** and **420***b* has a U shape.

The same arrangement of seals is found overall for producing the sealing between the outer sliding frame and the fixed frame. There are thus, with reference to FIG. **2**, a top seal **430** identical to the bottom seal and anchored in the same way in a groove **352** produced in the top cross member **350***a* of the outer sliding frame **30***b*.

In FIG. **3**, each lateral seal **440***a*, **440***b* is identical to its homologue **420** and is housed in a groove **222**, one side of which extends so as to form a rim **224**.

There also, and with reference to FIG. **4**, a continuity of sealing is obtained between these three seals **440***a*, **430** and **440***b*, which has an inverted U shape "⊓".

To complete this sealing, so as to obtain perimeter continuity and sealing between the sliding frames, the sealing system T also comprises two sliding inter-frame seals **360** referred to as cross-member seals, since they work between the top cross member of the inner sliding frame and the bottom cross member of the outer sliding frame, and intermediate seals **390** arranged so as firstly to join the ends of the two cross-member seals **360** and secondly to join the lateral seals **420**, **440** of the two sliding frames in their closed position.

In FIG. **2**, each cross-member seal **360** is composed of a flexible profile comprising an anchoring nose housed in a groove **354** produced longitudinally in the width of the bottom cross member **350***b* of the outer sliding frame **300***b* and in the width of the top cross member **350***a* of the inner sliding frame **300***a*, the anchoring nose being joined to a sealing weatherstrip. The grooves **354** are preferably produced aslant, for example at 45°, while being parallel to each other. They are produced in the faces turned opposite the two cross members **350** so that the seal housed in the groove of one cross member **350***a* can come into contact with a bevelled corner bordering the face of the other cross member **350***b* and vice versa, and this in the closed position of the two sliding frames **300**.

In FIG. **4**, the intermediate seals **390** are composed, on each side of the window, of an end seal **392** and two connecting seals **394** and **396**. Each end seal **392** consists of a slat fixed against the corresponding upright of the fixed frame and is positioned so as to be able to be sandwiched between the two cross-member seals **360** in the closed position of the sliding frames in order to procure continuity of sealing at the ends of the two cross-member seals **360**.

Each connecting seal **394** is fixed at the top part of the upright of the inner sliding frame in order to come into contact with the flat sealing part of the corresponding lateral seal and also comes to bear on the end of a top cross-member seal **360** in the closed position of said sliding frame.

Each connecting seal **396** is fixed at the bottom part of the upright of the outer sliding frame in order to come into contact with the flat sealing part of the corresponding lateral seal and also comes to bear on the end of the other bottom cross-member seal **360** in the closed position of said sliding frame.

Under these conditions, continuity of sealing is obtained between the two pairs of adjoining lateral seals, via the connected ends of the two cross-member seals, procuring in this way a sealed connection at the periphery of each sliding frame and between the two sliding frames, in their closed position.

This sealing system T that equips the sash window of the invention forms, without discontinuity, a sealed perimeter bead on the one hand around the two sliding frames and on the other hand between the two sliding frames, when they are closed.

The sealing system T is thus in a position to satisfy the requirements of the permeability to air of the windows having regard to the requirements of certain current standards, among which let us cite the standard NF DTU 36-5 for France, the standard CAN3-A440-M84 for Canada and the standard E 283-84 for the United States. The French standard, for example provides for a test for permeability to air where the maximum pressure reaches 600 Pa.

Impermeability to moisture and to driving rain has been obtained by having found a solution for firstly preventing the sealing system T being impacted by the presence of traces of moisture and on the other hand preventing despite everything any presence of water in contact with the seals being able to impair their sealing.

In the detailed view in FIG. **5**, a gap I**1** remains for this purpose between the rear face of the extension in a return **214** and the front face of the two uprights **310** and the front face of the top cross member of the outer sliding frame (not visible in this FIG. **5**, but apparent in FIG. **2**). Its width L is such that it can stop the passage of drops of water or driving rain in order to prevent their presence affecting the correct functioning of the seals. The width L of this gap I is preferably less than 1.5 mm. The gap I**1** is also visible in FIG. **2**.

The gap I**1** emerges in a pressure-balancing chamber C**1** situated at the rear of the extension in a return **214**. It is delimited firstly between each upright **210** of the fixed frame **200** and each upright **310** of the outer sliding frame **300***b* and secondly between the top cross member of the fixed frame and the top cross member of the outer sliding frame (not visible in this FIG. **5** but apparent in FIG. **2**). It communicates by juxtaposing them with the two lateral seals **440** as well as with the top seal **430** represented in this FIG. **5** by a discontinuous line. These seals are thus subjected, on their

parts exposed on the outside of the window, to the external biometric pressure. The absence of overpressure assists the sealing work of the seals.

The chamber C1 has the shape of an inverted U "⊓", identifiable by its three branches in FIG. 7. It emerges through the bottom ends of its two vertical branches, thus effecting drainage of any traces of water that might have been able to enter despite everything as far as contact with said seals. The drainage is represented by the arrows D1. It is achieved below the uprights **310** of the outer sliding frame **300***b* through closure inserts **320** described in detail below.

With reference to FIG. **6**, a second gap **12** is delimited between each strip **212** and a recess on the front face of each upright **310** of the inner sliding frame **300***a*. Its width L is preferably less than 1.5 mm. The gap **12** emerges in another pressure-balancing chamber C2 situated at the rear of the two strips **212**. It is delimited between the two strips **212** and the two uprights **310** of the inner sliding frame **300***a*. In FIG. **7**, the chamber C2 has a U shape identifiable by its three branches. Its horizontal bottom branch is connected to at least one drain represented by the arrows D2 and here two in number. In FIG. **2**, the drain D2 is the form of an inclined conduit passing through the bottom cross member **250***b* of the fixed frame **200** so as to be connected to the intermediate branch of the chamber C2 in order to discharge the water collected, through the front face of said bottom cross member, lower down and outside.

In FIGS. **5** and **6**, the presence of brush seals J can be noted, intended to limit the natural operating clearance of the sliding frames **300** in the fixed frame **200**. They are disposed in grooves produced longitudinally along the lateral edges of the uprights **310** of the sliding frames.

In FIG. **7**, two closure inserts **320** are fixed to the bottom cross member of the outer sliding frame **300***b* while being disposed in line with two outlets of the chamber C1, that is to say level with the free ends of its vertical branches. They are perforated so that any droplets drained in the chamber C1 can be discharged under said sliding frame. They also serve as a support for the connecting seals **396**.

Similarly, two other closure inserts **322** are fixed to the top cross member of the inner sliding frame **300***a* level with the top outlet of the two vertical branches of the chamber C2. They are solid, that is to say closed in order to close off the two top outlets so as to keep the inner sliding frame **300***a* sealed at this point. They also serve as a support for the connecting seals **394**. The inserts **320** and **322** are also visible in FIG. **3**, where it can be seen that the insert **320** is perforated in line with the vertical branch of the chamber C1 and the insert **322** is closed, in this way closing off the vertical branch of the chamber C2.

The pressure-balancing chambers C1 and C2 procure favourable technical conditions for the seals by preventing their being wetted and avoiding variations in pressure on their sides exposed to the outside of the window.

In FIG. **2**, the window **100** is provided with means **230** for positioning at least one sliding frame **300**, active in its closure position, and which are designed to prestress respectively the lateral seals **420** and/or **440** of said sliding frame against their bearing surfaces, that is to say the front faces of the uprights **300**. These positioning means comprise, in respect of one of the sliding frames and here the inner frame **300***a*, two pairs of pins **232** fixed to the inner faces of the two uprights **210** of the fixed frame **200**, and two pairs of corresponding arches **234** fixed to the uprights **310** and which straddle the pins in the closure position of said sliding frame.

The positioning means **230** for the other sliding frame **300***b* advantageously comprise two fingers **236** secured to the top cross member **350***a* of said sliding frame and which can fit in two corresponding insertions **238** fixed in the top cross member **250***a* of the fixed frame **200**. The bottom part of this outer sliding frame **300***b* is pressed against the lateral seals **440** by manoeuvring the latches **370**, which are in this way designed so as to position the bottom part of the outer frame **300***b* with respect to the top part of the inner frame **300***a*, itself positioned on the uprights **310** through its positioning means **230**.

The sash window of the invention achieves performances with regard to sealing which rival those of casement windows. The arrangement of its seals and the presence of pressure-balancing chambers confer on it in fact a level of airtightness and watertightness that satisfy current standards and in particular the standards NF P 20.302 of May 2008 and NF EN 12207 of May 2000.

Its framework, preferably manufactured from wood, procures for it a beautiful appearance while limiting thermal losses.

The invention claimed is:

1. A sash window comprising:

a fixed frame,

at least one inner sliding frame that is configured to slide between an open position and a closed position of the window,

at least one sliding or fixed outer frame, wherein a sealing system comprises seals that are interposed between the fixed frame and said inner sliding frame,

said sealing system comprising:

two lateral seals,

a top cross-member seal,

a bottom cross-member seal, and

intermediate seals that join on at least two sides of the inner sliding frame the cross-member seals and the lateral seals, so as to form a continuity of sealing between the cross-member seals and the lateral seals in the closed position of said inner sliding frame, wherein the intermediate seals comprise two end seals respectively sandwiched between two ends of the cross-member seals in the closed position of the inner sliding frame.

2. The sash window according to claim **1**, wherein the intermediate seals comprise two connecting seals maintained in contact respectively with the two lateral seals and which bear on two ends of the top cross-member seal of said inner sliding frame in the closed position.

3. The sash window according to claim **1**, wherein the lateral seals are retained in two uprights constituting the fixed frame while being applied against a front face of two corresponding uprights constituting the inner sliding frame, and in that the sash window further comprises a bottom seal held in a bottom cross member of said inner sliding frame, the bottom seal contacting ends of the lateral seals while bearing on a bottom cross member of the fixed frame.

4. The sash window according to claim **3**, wherein the fixed frame comprises two vertical separation strips and a gap is formed between the two vertical strips and the front face of the two corresponding uprights of the inner sliding frame, and the width of which is sized to prevent drops of water passing.

5. The sash window according to claim **4**, wherein the gap emerges in a pressure-balancing chamber that communicates with the two lateral seals of the inner sliding frame, said chamber having a U shape, a horizontal bottom branch of which is connected to at least one drain.

6. The sash window according to claim 1, wherein the outer frame is of the sliding type, the intermediate seals comprising two connecting seals held in contact respectively with two other lateral seals held in two uprights of the fixed frame while being applied against a front face of two corresponding uprights constituting the outer sliding frame, said connecting seals bearing on two ends of the bottom cross-member seal of said outer sliding frame, in its closed position, and in that a top seal is held in a top cross member of said outer sliding frame, the top seal contacting ends of said other lateral seals while bearing on a top cross member of the fixed frame.

7. The sash window according to claim 6, wherein a gap is formed between a framework of the fixed frame and a front face of the top cross member of the outer sliding frame as well as the front face of the two corresponding uprights of the outer sliding frame and the width of which is sized to prevent drops of water passing through the gap.

8. The sash window according to claim 7, wherein the gap emerges in a pressure-balancing chamber that communicates with the two other lateral seals of the outer sliding frame, as well as with the top seal, said chamber having an inverted U shape and comprising two vertical branches having openings in bottom ends of the two vertical branches.

9. The sash window according to claim 8, wherein free ends of the two vertical branches of the chamber are closed off by inserts that hold in place the connecting seals, the inserts closing off the bottom ends of the two vertical branches of the chamber being perforated to enable any droplets of water to be discharged.

10. The sash window according to claim 1, further comprising means for positioning at least one sliding frame that, when the at least one sliding frame is in a closed position, is designed to engage a lateral seal of said two lateral seals of said at least one sliding frame against a front face of an upright of said at least one sliding frame.

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